Robotic Exploration of Space at NASA's Jet Propulsion Laboratory (JPL)

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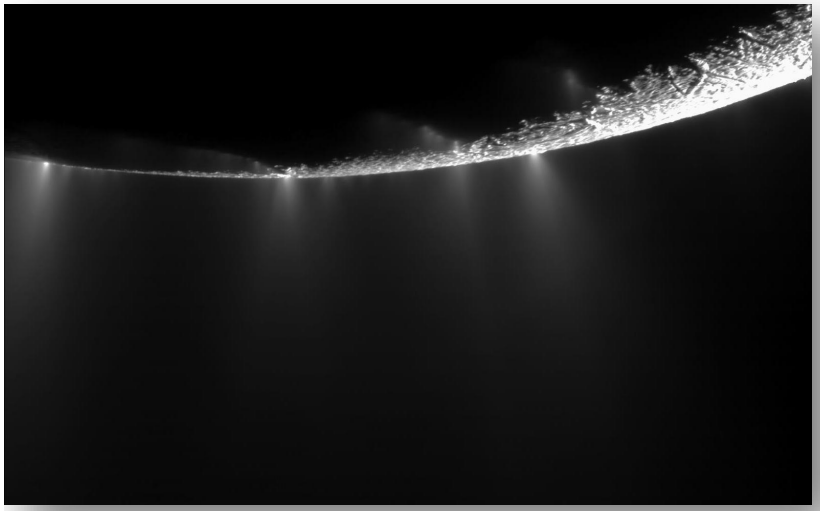
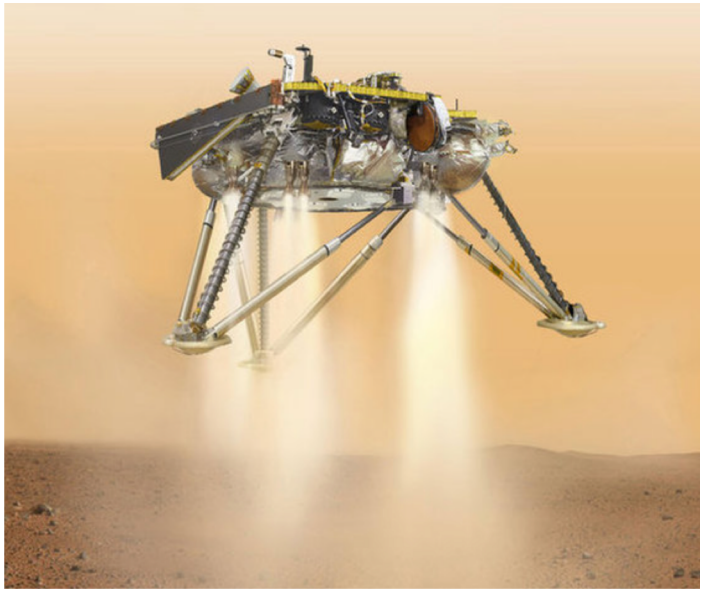
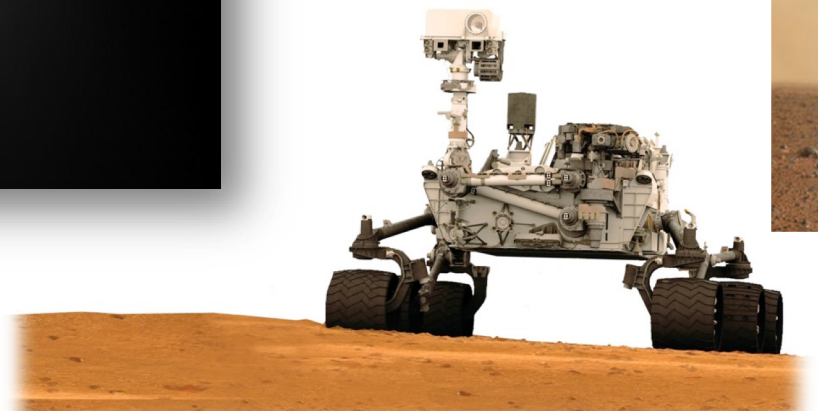
Jet Propulsion Laboratory
California Institute of Technology







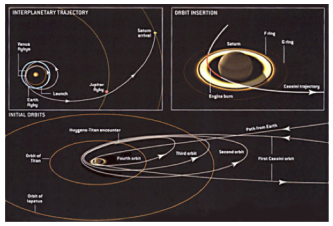
JPL is part of NASA and Caltech

- Federally-funded (NASA-owned) Research and Development Center (FFRDC)
- University Operated (Caltech)
- $2.3B Business Base
- 6,000 Employees

- 167 Acres (includes 12 acres leased for parking)
- 139 Buildings; 36 Trailers
- 673,000 Net Square Feet of Office Space
- 906,000 Net Square Feet of Non-Office Space (e.g., Labs)

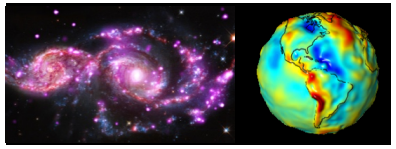
End-to-End JPL Capabilities Needed to Implement Missions

Project Formulation - Team X

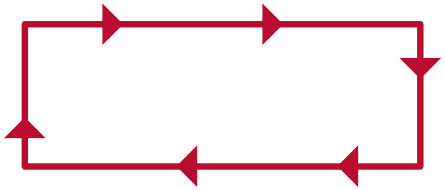


Mission Design

Mars Rovers



Scientific Research

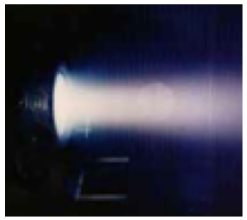


Large Structures-SRTM

Real Time Operations

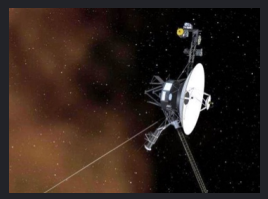
Environmental Test

Integration and Test

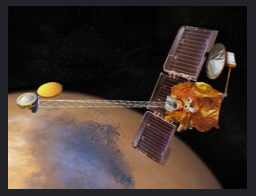


Spacecraft Development

Active Spacecraft Across the Solar System and Beyond

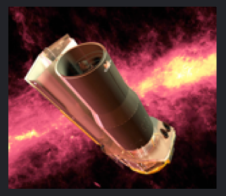


Two Voyagers (1977)

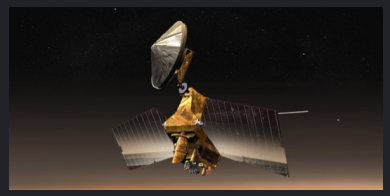


Mars Odyssey (2001)

Opportunity (2003)



Spitzer (2003)

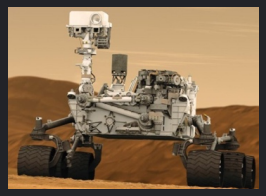


Mars Reconnaissance Orbiter (2005)

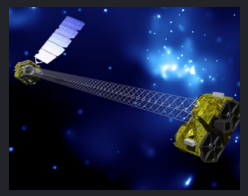
Dawn (2007)

NEOWISE (2009)

Juno (2011)

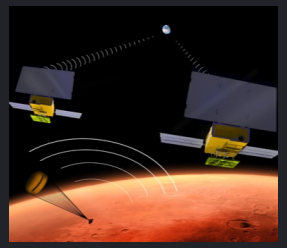


Curiosity (2011)



NuSTAR (2012)

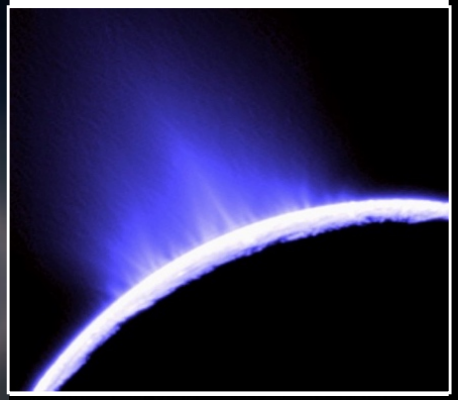
InSIGHT (2018)

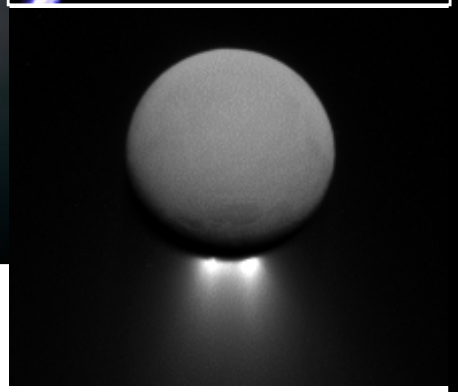


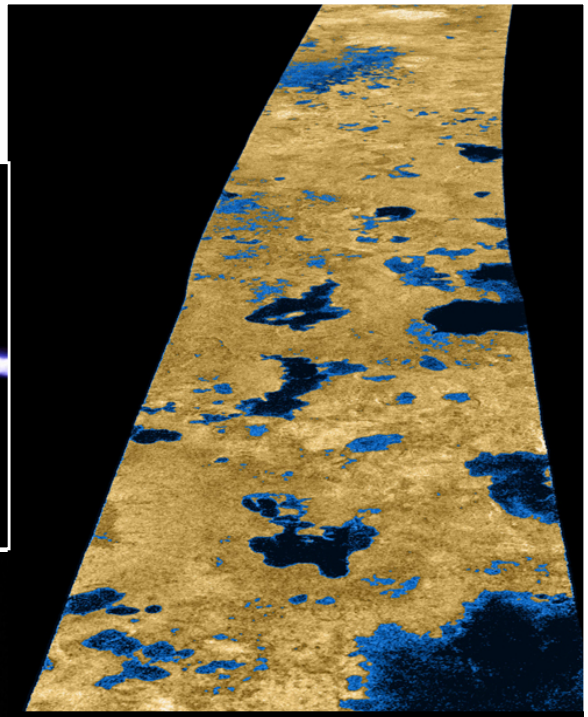
MarCO

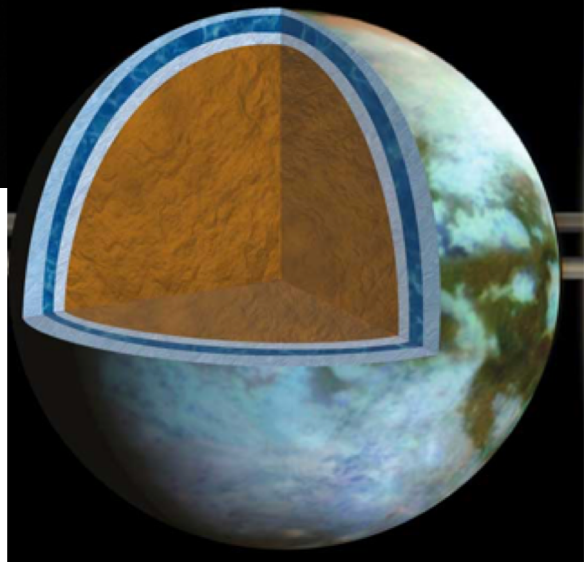
JPL

Cassini/Huygens elucidates Saturn rings, Enceladus' geysers, and Titan's lakes and ocean









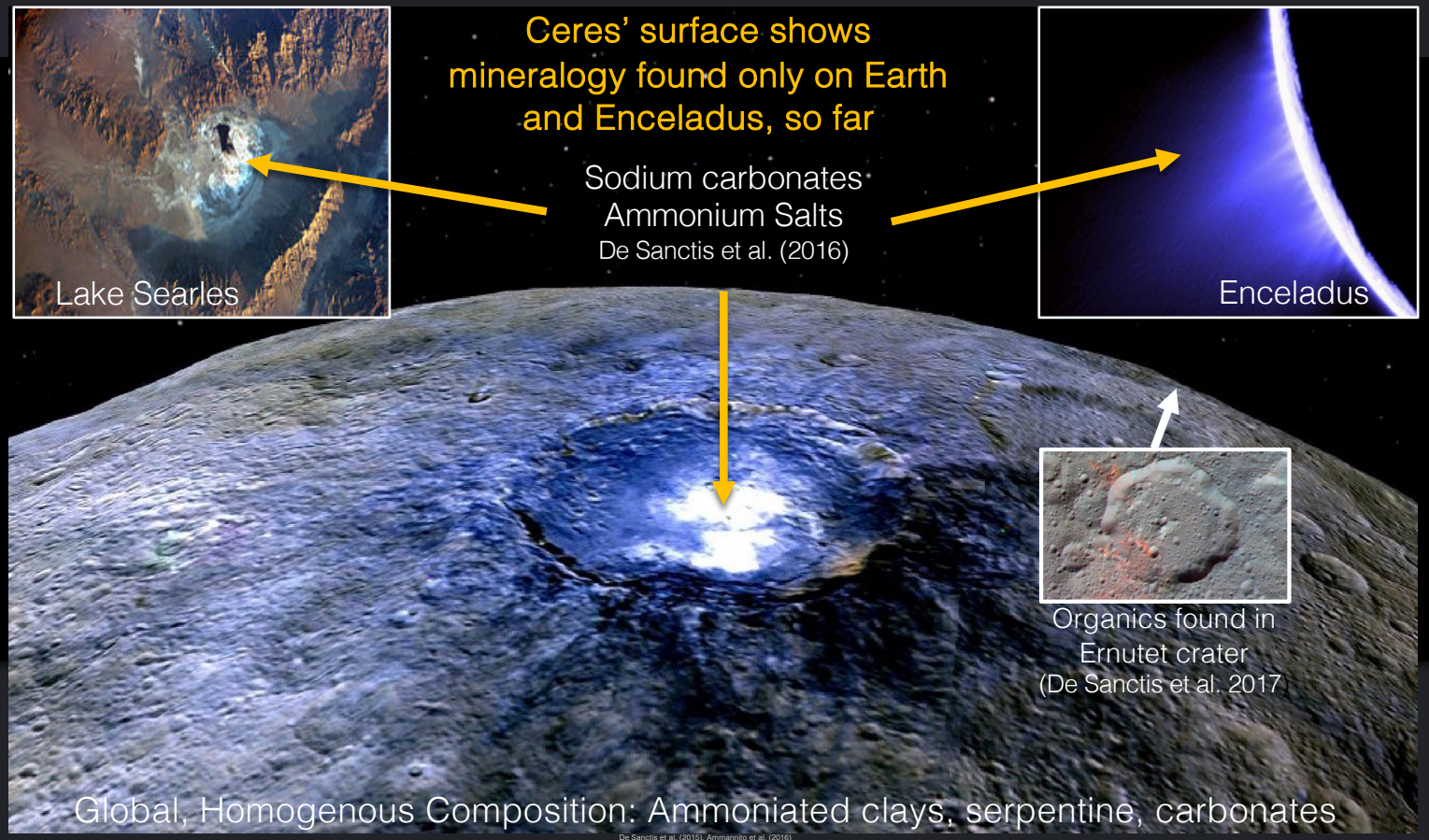
Strata at Base of Mt. Sharp

Indicates the flow of water before the mountain formed

JPL

Dawn revealed Ceres to be a chemically active world

10 Years Since Launch

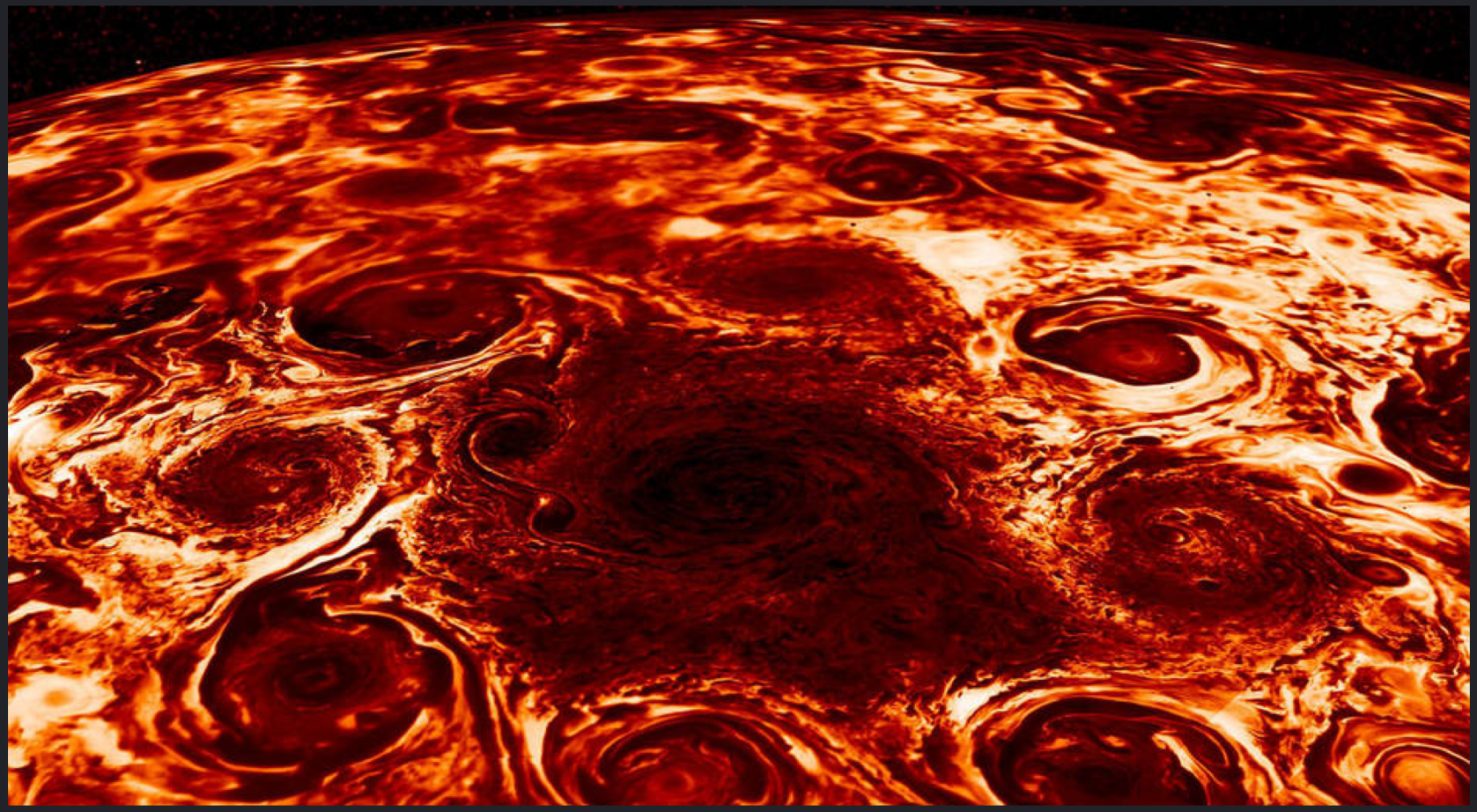


De Sanctis et al. (2015), Ammannito et al. (2016)

JPL

JUNO Reveals Cyclones at Jupiter North Pole

Less than 2 years since Orbit Insertion



Decadal Surveys Set The Framework for Exploration

Reports prepared by National Academy of Sciences at the request of Congress and NASA

10-year plans outlining scientific goals and missions representing input from scientists leaders in the field in Astrophysics, Planetary Science and Earth Science communities in the United States (and beyond)

Represent the official consensus on the top priority scientific goals, and the missions required to meet them

Planetary Science Analysis Groups are a Vehicle to Explore Collaboration

Community based interdisciplinary forums for analysis in support of future exploration
Findings of analyses are provided to NASA through the NASA Advisory Council

Curation and Analysis Planning Team for Extraterrestrial Materials (CAPTEM)

Lunar Exploration Analysis Group (LEAG)

Mars Exploration Analysis Group (MEPAG)

Outer Planets Assessment Group (OPAG)

Small Bodies Assessment Group (SBAG)

Venus Exploration Analysis Group (VEXAG)

SUMMARY OF THE CURRENT STATUS OF THE MARS EXPLORATION PROGRAM

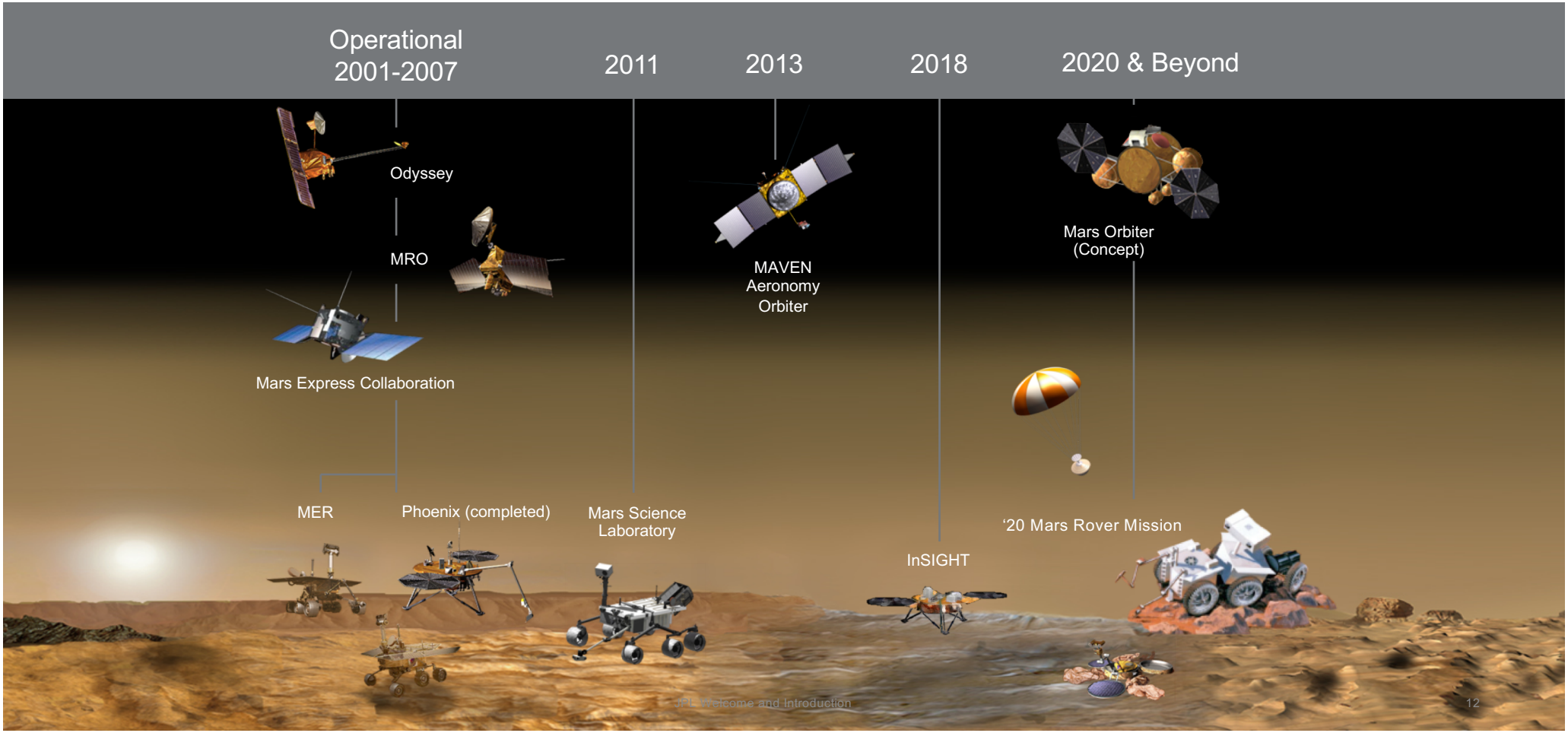
From Visions into Voyages for Planetary Science in the Decade 2013-2022: A Midterm Review (2018)

"NASA has been exploring Mars for over 50 years. Mars is a high priority for scientific study because of its strong relevance to all of the science themes of *Vision and Voyages*, and because it is a destination for future human explorers.

MEP has made additional discoveries since *Vision and Voyages* that reinforce this high priority and pose important new science questions. Mars 2020 will take the important first step toward the highest science priority in *Vision and Voyages*, MSR, by collecting and caching carefully selected and well-documented samples.

The MEP currently lacks, and should promptly develop, a comprehensive plan, architecture, management and international partnering approach, and funding profile to implement the next steps in Mars exploration including and beyond completion of MSR."

Mars Exploration Program



NASA International Collaborations

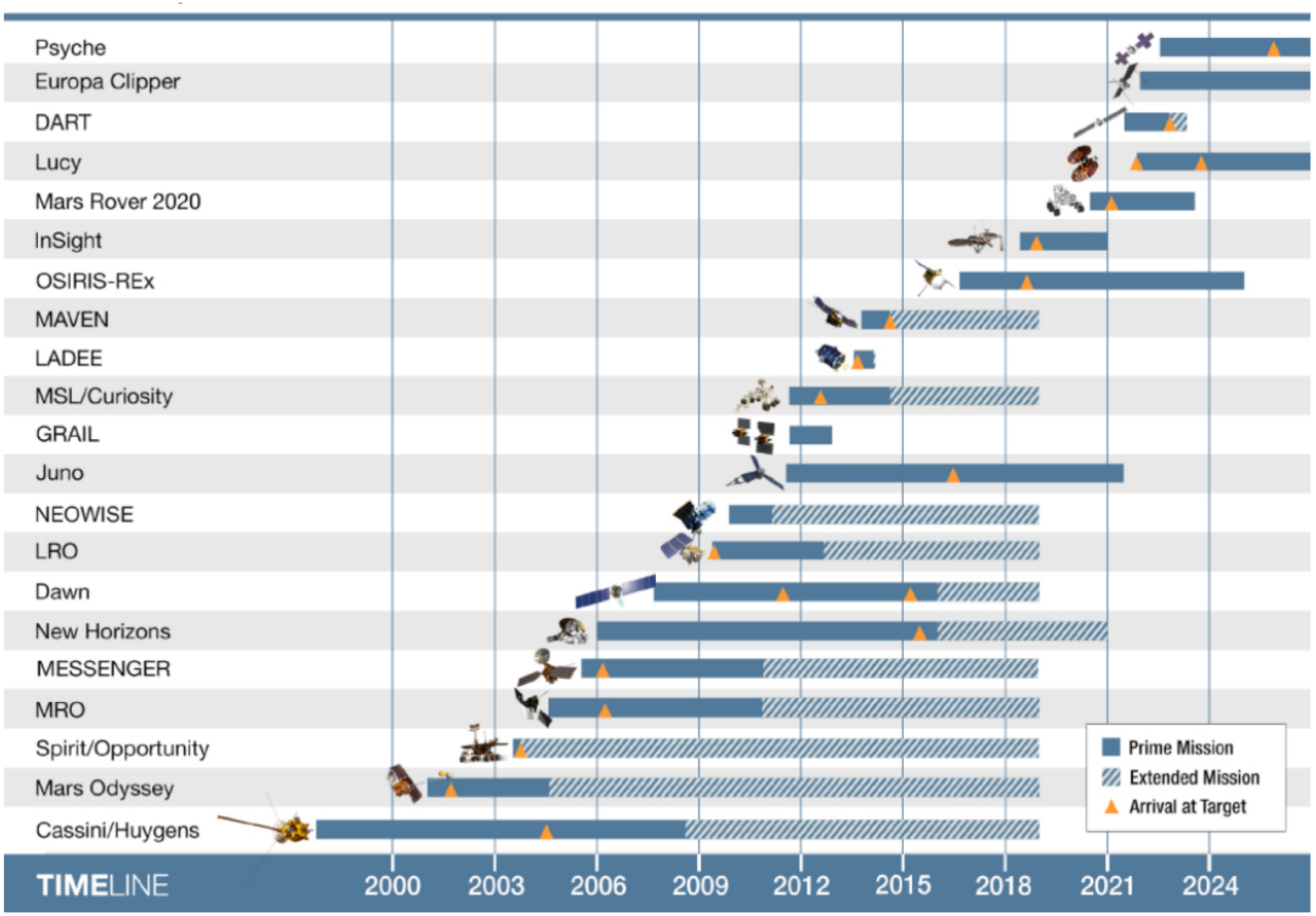


FIGURE S.1 Recent, current, and in-development NASA planetary science missions and international missions in which NASA is participating. SOURCE: Courtesy of NASA.

STUDENTS/POSTDOCS OPPORTUNITIES AT JPL

JPL Postdoctoral Scholars Program

Candidates respond to a specific advisor research AO, Funded by JPL PI

http://postdocs.jpl.nasa.gov/

NASA Postdoctoral Program (NPP)

Candidates write research proposal in response to advisor AO, primarily funded by NASA's Science Mission Directorate (SMD) as an institutional research award to the Center/JPL

http://npp.usra.edu

General Requirements

Candidates must have completed all requirements of their PhD (must be within 5 years)

Postdoc appointments are full-time and research must be conducted at JPL

Specific to foreign students (at foreign institutions)

JVSRP – JPL Visiting Student Research Program

Requires students securing funding from their government, institution and/or other sources

Requires invitation from JPL researcher serving as host of internship

https://www.jpl.nasa.gov/edu/intern/apply/

(or just Google "JPL internships")

NASA Education Office Programs for foreign students

Applicable to students of countries with whom NASA has stipulated an agreement

https://intern.nasa.gov/non-us-opportunities/index.html

GRAZIE PER L'ATTENZIONE!